

Remarks

Reconsideration and allowance of the subject patent application are respectfully requested.

Applicants gratefully acknowledge the indication that claims 76, 78 and 79 are allowable and that claims 104, 106, 110 112 and 116 contain allowable subject matter.

Claims 107 and 111 were rejected under 35 U.S.C. Section 112, first paragraph, as allegedly being "single means" claims. While not acquiescing in this rejection, claim 107 (from which claim 111 depends) has been amended to address the issues raised in the office action.

Claims 132 and 133 were rejected under 35 U.S.C. Section 112, second paragraph, as allegedly being indefinite. While not acquiescing in this rejection, claim 132 and claim 133 have each been amended to address the issues raised in the office action.

Claims 81 and 113-118 were rejected under 35 U.S.C. Section 101 as allegedly being directed to non-statutory subject matter. Based on the comments in the office action, claim 81, claim 113 (from which claims 114-117 depend) and claim 118 have each been amended to refer to a computer readable medium "encoded with" a computer program. Consequently, withdrawal of the Section 101 rejection is respectfully requested.

Claims 101-103, 105, 107-109, 111, 113-115 and 117 were rejected under 35 U.S.C. Section 102(b) as allegedly being "anticipated" by the Highnam et al. paper entitled "Computing the Scatter Component of Mammographic Images". For the reasons set forth below, Applicants traverse this rejection.

The Highnam paper, whose authors include the inventors of the subject patent application, does not disclose any method of delimiting in a mammogram compressed from uncompressed regions of the breast. The paper certainly does not disclose the detection of the

smoothness of equal intensity curves, and using this smoothness to perform delimitation. The Highnam paper notes that breast edge effects cause a problem, and in particular cause the calculated value for the thickness of interesting tissue to be less than zero (see page 309 left-hand column, first bullet point) and this in turn results in the bright area around the breast edge visible in Figure 13. However, the paper only discusses this as a problem. The paper does not disclose as a solution the idea that the compressed and uncompressed regions of the breast can be delimited to avoid this problem.

The office action refers to equation (1) at the bottom of page 302 of the Highnam paper. This equation indicates that the thickness of interesting issue and thickness of fat are regarded as summing to H , which is the compressed breast thickness (i.e., the distance between the compression plates). Normally, in mammography, the value H is known from the set up of the machine. The illustrative embodiments of the subject patent application provide by way of example and without limitation a way of calculating H from the mammogram itself when this value has not been recorded and passed on to the image analysis process (i.e., when H is unknown). The illustrative embodiments aim to find the value of the thickness of interesting tissue and for this the value of the total breast thickness H is required. So if that value has not been recorded at the time the mammogram was taken (i.e., the distance between the compression plates was not measured) this would cause a problem. The inventors of the subject patent application realized that H can be calculated if one delimits the compressed breast area from the uncompressed area, and then realized that this could be achieved by looking at the smoothness of curves of equal intensity in the mammogram.

The office action also refers to Figure 1 in the Highnam paper, but this does not disclose the calculation of H by detection of curves of equal intensity. Figure 1 shows measurements of

"scatter-to-primary ratio" on two "circular Lucite phantoms." This is explained at page 303, right hand column, section D, second paragraph which says:

Barnes and Bresovich measured the number of scattered and primary photons reaching a NaI(Tl) crystal detector having passed through a circular lucite phantom 14 cm in diameter. They varied the thickness of the lucite and the diameter of the circular radiation field.

Thus, Figure 1 shows how the scatter-to-primary ratio varies with radiation field for different thickness of phantoms. It does not show the detection of curves of equal intensity in a mammogram (there is no intensity shown in Figure 1), and is in fact not a mammogram but is a measurement on a lucite phantom.

The office action also refers to subsection B [Verification of Model] described on pages 308 to 311 of Highnam. However these sections describe that the values calculated for interesting and fatty tissue can be compared to the known compressed breast thickness H in order to verify whether the model is producing sensible results. This section acknowledges that in the uncompressed area of the breast the results could be strange, but that is precisely because the thickness of the breast here is not H . Consequently it is a positive verification of the model if the values of interesting and fatty tissue are reasonable in the compressed region and not in the uncompressed region. However there is no disclosure here of the calculation of H from the mammogram (instead it is the known distance between the compression plates which is the basis for comparison), and there is no detection of the smoothness of curves of equal intensity. One can see that in Figure 13 some areas must be uncompressed because of the bright area at the edge representing "wrong" values for the thickness of interesting tissue. But there is no detection of the actual delimitation between compressed and uncompressed regions. One cannot tell in

Figure 13 where the delimitation between compressed and uncompressed areas lies, and there is certainly no detection of that boundary.

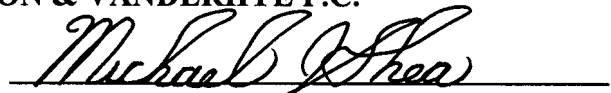
Independent claims 101, 107 and 113 all require the calculation of the compressed thickness of the image breast from a mammogram and this is not done in the Highnam paper. The Highnam paper relies on knowing the compressed breast thickness by measurement of the distance between the compression plates, as was conventional. The claims also require that the value of H is calculated by delimiting compressed from uncompressed regions, and the Highnam paper does not disclose this either. The claims also require that this delimitation is performed by detecting the smoothness of curves of equal intensity in the mammogram. The Highnam paper does not disclose detecting curves of equal intensity, nor detecting their smoothness.

Consequently, Applicants respectfully submit that claims 101, 107 and 113 and the claims that depend therefrom patentably distinguish over the Highnam paper and favorable office action is respectfully requested.

Respectfully submitted,

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By:

A handwritten signature in cursive script, appearing to read "Michael J. Shea", is written over a horizontal line.

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